

CLAIMS

What is claimed is:

1. A golf ball comprising:
 - a multi-layer core having:
 - a center comprised of a fully neutralized ionomer and having a Shore C surface hardness of less than about 85 and a compression of less than 90,
 - at least one rigid outer core layer having a flex modulus greater than 40,000 psi and a Shore C hardness of greater than 80;
 - an intermediate core layer interposed between the center and the rigid outer core layer having a flex modulus less than 20,000 psi and a Shore C hardness less than 60; and
 - a cover having a Shore D hardness of less than 65.
2. The golf ball according to claim 1, wherein the center has a compression of less than 75.
3. The golf ball according to claim 1, wherein the center has a Shore C hardness of less than 75.
4. The golf ball according to claim 1, wherein at least one rigid outer core layer has a Shore C hardness of greater than 85.
5. The golf ball according to claim 1, wherein the cover has a Shore D hardness of less than 60.
6. The golf ball according to claim 1, wherein the multi-layer core has a diameter greater than 1.55 inches.
7. The golf ball according to claim 1, wherein each core layer has a thickness from about 0.015 to 0.05 inches.

8. The golf ball according to claim 1, wherein the ionomer comprises a polymer containing an acid group, a base, and an organic acid or a salt thereof, the base and the organic acid or salt thereof being present in sufficient amounts such that the polymer is fully neutralized.
9. The golf ball according to claim 1, wherein the ionomer is neutralized by one or more alkali metal, transition metal, or alkaline earth metal cation.
10. The golf ball according to claim 8, wherein the alkaline earth metal cation is selected from the group consisting of lithium, sodium, potassium, magnesium, calcium, barium, zinc, or a combination of such cations.
11. The golf ball according to claim 1, wherein the center has a specific gravity of less than 1.1 g/cc.
12. The golf ball according to claim 11, wherein at least one of the core layers has a specific gravity of greater than 1.25 g/cc.
13. The golf ball according to claim 11, wherein at least one of the core layers has a specific gravity of greater than 1.5 g/cc.
14. The golf ball according to claim 11, wherein at least one of the core layers has a specific gravity of greater than 1.75 g/cc.
15. A golf ball comprising:
 - a multi-layer core having:
 - a center having a Shore C surface hardness of less than about 85 and a compression of less than 90,
 - at least one outer core layer having a Shore C hardness of greater than 80, and a specific gravity of greater than 1.25 g/cc; and
 - a cover having a Shore D hardness of less than 65,

wherein the center and at least one outer core layer is comprised of an ionomer resin having a fully neutralized acid moiety.

16. The golf ball according to claim 15, wherein the acid is selected from a group consisting of caproic acid, caprylic acid, capric acid, lauric acid, stearic acid, behenic acid, erucic acid, oleic acid and linoleic acid.

17. The golf ball according to claim 15, wherein the center has a Shore C hardness of less than 75.

18. The golf ball according to claim 15, wherein the center has a Shore C hardness of less than 66.

19. The golf ball according to claim 15, wherein at least one outer core layer has a Shore C hardness of greater than 85.

20. The golf ball according to claim 15, wherein at least one outermost core layer has a specific gravity of greater than 1.30 g/cc.

21. The golf ball according to claim 15, wherein at least one outermost core layer has a specific gravity of greater than 1.50 g/cc.

22. The golf ball according to claim 15, wherein at least one outermost core layer has a specific gravity of greater than 1.75 g/cc.

23. The golf ball according to claim 15, wherein the center has a specific gravity of less than 1.1 g/cc.

24. The golf ball according to claim 15, wherein the cover has a Shore D hardness of less than 60.

25. The golf ball according to claim 15, wherein the multi-layer core has a diameter of from 1.50 inches to 1.66 inches.
26. A golf ball comprising:
a multi-layer core having:
a center comprised of an ionomer resin with a fully neutralized acid moiety and having a Shore C surface hardness of less than about 85 and a compression of less than 90,
a diameter from 1.58 inches to 1.66 inches,
at least one outer core layer having a Shore C hardness of greater than 80, and a specific gravity of greater than 1.25 g/cc; and
a cover having a Shore D hardness of less than 65.
27. A golf ball comprising:
a multi-layer core having:
a center having a Shore C surface hardness of less than about 85 and a compression of less than 90,
at least one outer core layer having a Shore C hardness of greater than 80, and a specific gravity greater than 1.25 g/cc,
a second outer core layer comprising an ionomer resin with a fully neutralized acid moiety; and
at least one cover layer;
the at least one cover layer having a Shore D hardness of less than 65:
and,
the at least one cover layer is selected from a cast or reaction-injection moldable thermosetting material.
28. The golf ball according to claim 27, further comprises a second cover layer comprising an ionomer, thermoplastic polyurethane, polyamide, polyester or a single-site catalyzed polymer.

29. The golf ball according to claim 27, wherein the cover comprises a single layer having a thickness of about 0.010 inches to about 0.090 inches.

30. The golf ball according to claim 27, wherein the cover comprises a single layer having a thickness of about 0.020 inches to about 0.050 inches.